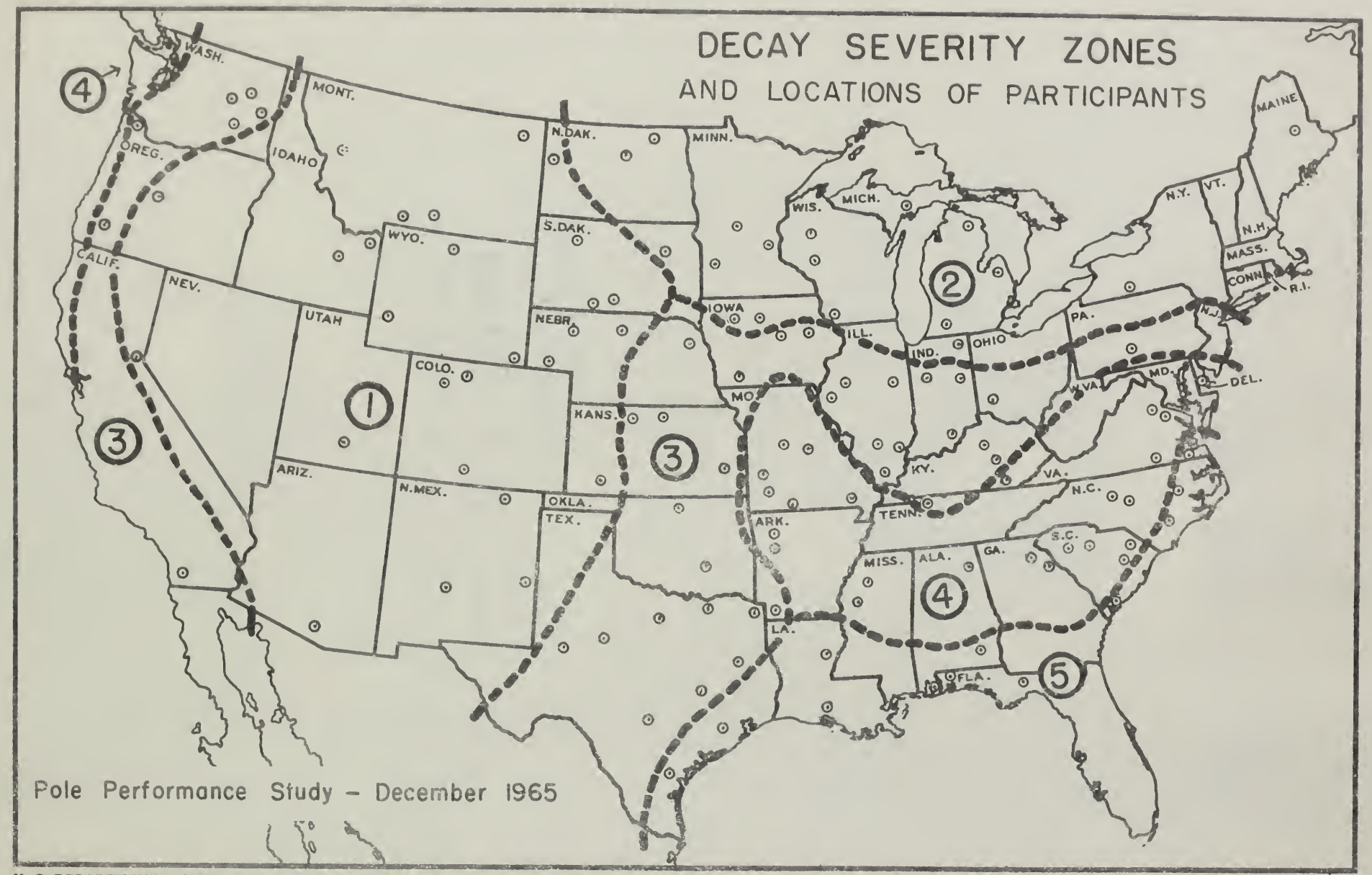
STAFF REPORT
11/15/65

PERFORMANCE OF WOOD POLES AS INDICATED BY REPLACEMENT EXPERIENCE ON 120 RURAL ELECTRIC DISTRIBUTION SYSTEMS, 1951 through 1963

Rural Electrification Administration
United States Department of Agriculture

FIGURE 1



U. S. DEPARTMENT OF AGRICULTURE

SOURCES: Average summer humidity and temperature (Atlas of Agriculture, 1936) and analyses by the Electric Standards Division, REA.

CONTENTS

TABLES

* * * * *

FIGURES

I. INTRODUCTION

This report is the result of a cooperative effort by REA and selected borrowers to learn more about what is happening to wood utility poles in service throughout the United States. The findings are developed from experience on 120 electric distribution systems during the years 1951 through 1963. There are approximately 3.5 million poles on these systems, and over 200,000 casualties were reported during the 13 years of the study. Locations of the participating systems are shown on the map of Figure 1. Also shown are five "decay zones," which have been designated for this study in an effort to group like experience with regard to severity of decay conditions.

Participants in the pole study furnish information about poles purchased and poles disposed of during the time of the study, on REA Forms 860c and 287 respectively. Samples of these forms are included as Appendix I. Additional details on information requested are given in Appendix II, Requirements for Input Data.

The findings are presented without any overall "smoothing" or adjusting. Editing of incoming data has been as follows:

A. The pole species, preservative and method of treatment were filled in when missing. Sources for such editing were:

   1. Other reports from the same system, particularly the report of pole purchases, REA Form 860c (when editing subsequent reports of casualties on REA Form 287).

   2. Clues in the reports, such as references to supplier or use of descriptive terms carrying particular connotations.

   3. Follow-up inquiries by mail, telephone, or (occasionally) field visits.

B. Major inconsistencies or obvious inaccuracies were corrected at the time of coding from information at hand, or after consultation (usually by letter) with respondents.

C. The numbers of poles owned by individual participants, according to records of this study, were compared with plant records and with miles energized, to minimize probable bias due to omission of data about pole purchases or pole casualties. Where significant discrepancies were evident, adjustments were made after consultation with the participant.

The proportion of participants to all active REA borrowers in each decay zone was as follows:

Decay zone	Borrowers			Line Miles		
	Borrowers in study	All active borrowers	Percent in study	Lines of mile (participants)	Lines of mile (all borrowers)	Percent in study
1.	27	160	16.88	37,654	208,266	18.08
2.	18	182	9.89	27,007	248,536	10.87
3.	39	314	12.42	67,054	512,889	13.07
4.	24	221	10.86	63,210	378,533	16.70
5.	12	91	13.10	21,369	151,639	14.09
	120	968	12.40	216,294	1,499,863	14.42

The above table includes all borrowers within the continental United States having energized lines on December 31, 1963.

II. SUMMARY AND CONCLUSIONS

A. The average rates at which poles have become casualties during the 13 years of this study, in each of the 5 decay zones, are as follows:

TABLE 1 AVERAGE ANNUAL CASUALTY RATE DUE TO EACH CAUSE
1951 through 1963

Decay Zone	All Causes	Casualties by cause				
		Decay	Lightning	Sleet	No damage	Other
	pct.	pct.	pct.	pct.	pct.	pct.
1.	.344	.180	.008	.019	.115	.022
2.	.410	.233	.018	.011	.130	.018
3.	.440	.170	.022	.005	.199	.044
4.	.735	.247	.012	.009	.427	.040
5.	1.074	.585	.023	.001	.381	.084

The "no damage" category is used where damage was not indicated as primary reason for removal. It may include some poles that were damage but not so reported.

B. Pole casualty rates are increasing as poles grow older. By 1963, casualty rates for all causes as shown in Table I reached 0.5 to 2.0 percent per year. Roughly half of these removals were due to damage or deterioration.

C. Poles of individual species, treatments and vintage years vary widely in apparent resistance to decay. This is particularly evident in southern pine poles produced during 1946 through 1948 and lodgepole pine poles produced during 1946 through 1953. Experience with poles of the 1946 through 1948 vintage years reflects the use of "alternate" and "standard" preservatives that evidently were not adequate in preventing decay. Lodgepole pine poles of 1949 through 1953 vintage years had a relatively high rate of of decay failures, attributed largely to the results of steam conditioning prior to treatment. After such poles were treated, further drying resulted in checking which exposed untreated heart wood, with increased failures resulting due to decay.

   The groups of poles referred to above (1946-48 southern pine and 1946-53 lodgepole) represent 32.7 percent of the casualties and 20.5 percent of all poles purchased through 1963 by participants in this study.

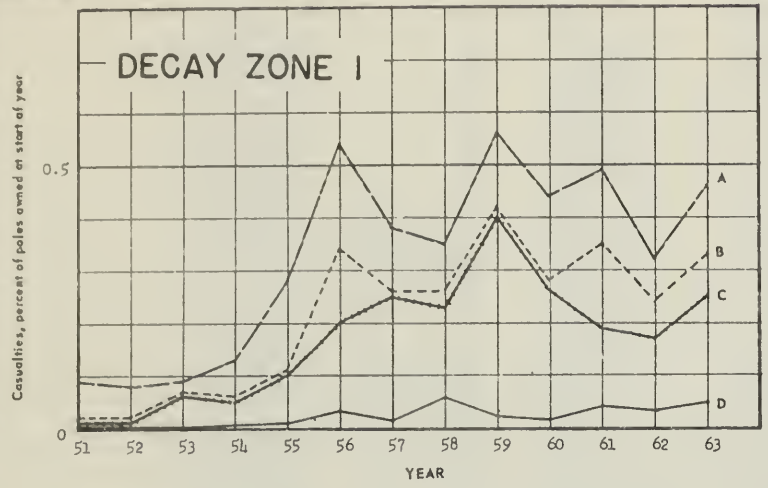
D. Lodgepole pine poles produced since 1954, and also those produced by certain suppliers (who were evidently using air-seasoned stock) in 1951 through 1953, have had a relatively low rate of replacement due to decay up to 12 years of age, approximately one twentieth as high as the average for lodgepole pine poles of earlier vintages at the same age.

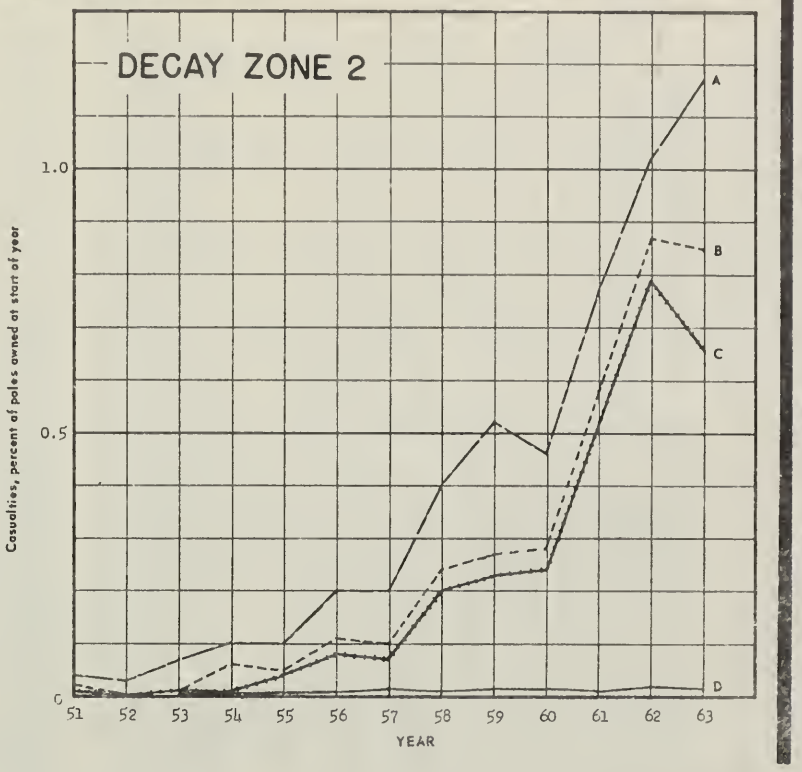
E. Experience with relatively small groups of penta-treated poles in each decay zone indicate a good degree of resistance to decay at ages up to 15 to 18 years, the maximum ages at which experience is now available.

F. The average life of poles treated in accordance with present-day specifications may be greater than is generally assumed.

III. YEAR BY YEAR TRENDS IN POLE CASUALTY RATES

Trends in overall pole casualty rates (for all descriptions of poles) during the years 1951 through 1963 are shown for each of the five decay zones in Figure 2. These curves show the year by year casualty rates due to:





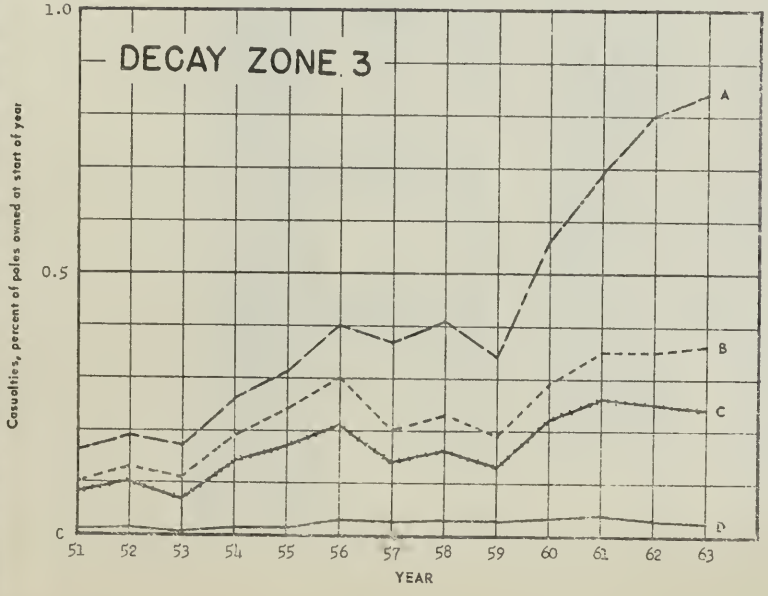
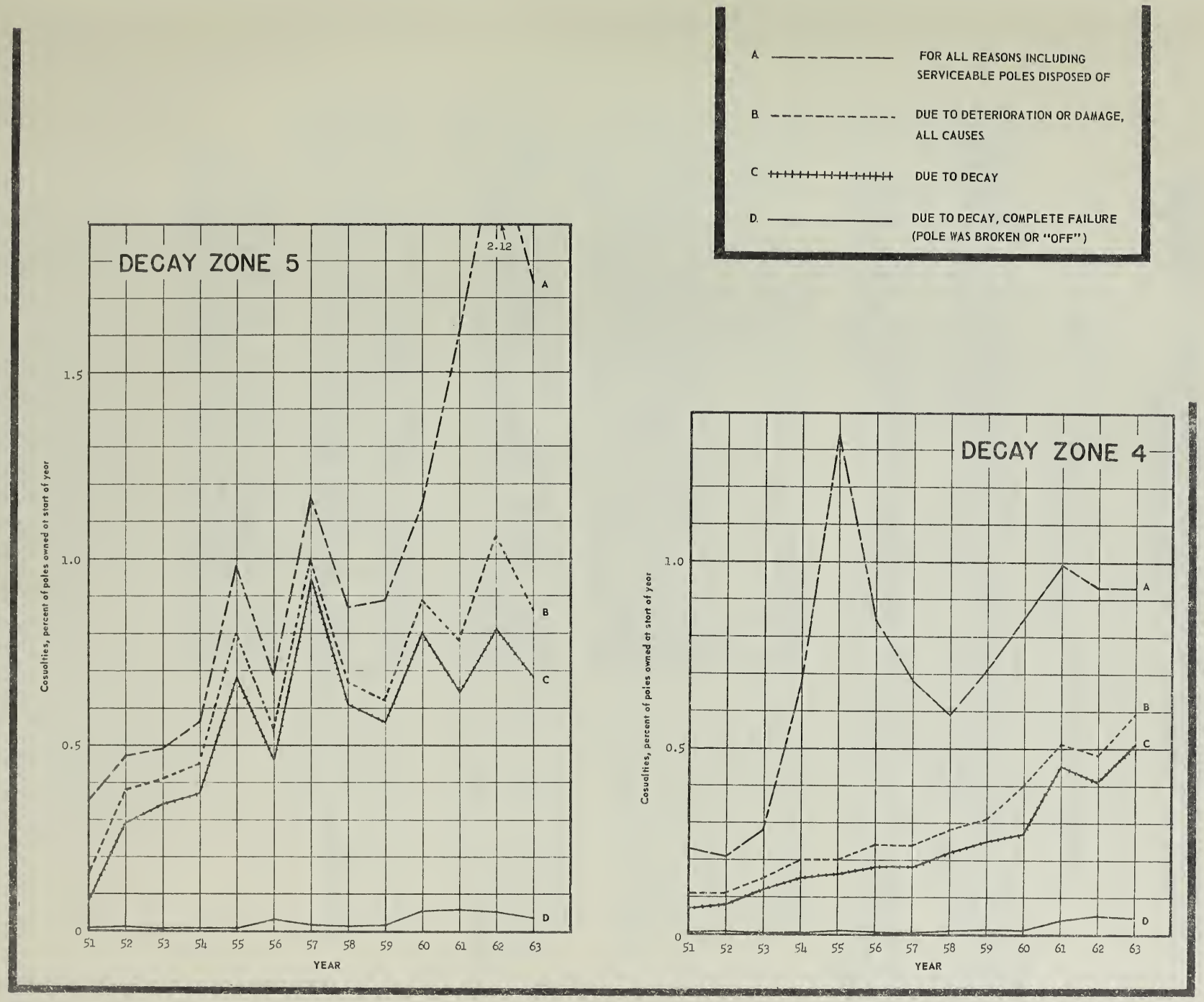


FIGURE 2

AVERAGE YEARLY CASUALTY RATE

1951 — 1963


A FOR ALL REASONS INCLUDING SERVICEABLE POLES DISPOSED OF
B DUE TO DETERIORATION OR DAMAGE, ALL CAUSES
C DUE TO DECAY
D DUE TO DECAY, COMPLETE FAILURE (POLE WAS BROKEN OR "OFF")
DECAY ZONE 5
2.12
A
B
C
D
1.5
1.0
0.5
0
Casualties, percent of poles owned at start of year
51 52 53 54 55 56 57 58 59 60 61 62 63
YEAR
DECAY ZONE 4
A
B
C
D
1.0
0.5
0
Casualties, percent of poles owned at start of year
51 52 53 54 55 56 57 58 59 60 61 62 63
YEAR

a. All causes (including all poles disposed of for any reason, whether serviceable or not).

b. Deterioration or damage for any reason, where the pole was reported broken or below required strength.

c. Deterioration due to decay.

d. Rotting or breaking off due to decay.

Each category above includes all of those that follow. The last group, while very small, is added because of its significance for indicating the degree of hazard that might exist due to decayed poles that break prior to replacement.

Additional details about the year-by-year experience in each decay zone are given in Tables 2.1 through 2.5. Figures printed in the individual columns are as follows:

Column No.	Explanation
1	Year
2	Number of poles owned at the start of year. This includes the number in plant and inventory, but not poles that have been stubbed. (Stubbed poles have already become casualties for purposes of this study.)
3	Number of casualties during year due to all causes. These include all poles that failed in service or were disposed of for other reasons. Casualty rates during year. (Percent of poles owned at start of year.)
4	Number of casualties and casualty rate (percent) due to decay.
5	"Broken off"--that part of "decay" casualties, column 4, in which the poles broke off or otherwise failed completely (due to decay) before they were found and replaced.

Column No.	Explanation
6 through 12	Number and percent of casualties during the year from each cause indicated in respective column headings.

IV. EXPERIENCE WITH INDIVIDUAL POLE SPECIES, TREATMENTS AND VINTAGE YEARS

The durability of poles, particularly their decay resistance, differs according to species, preservative treatment and age. Further, the quality of poles as originally produced in certain vintage (brand) years has varied considerably. It therefore becomes necessary to evaluate experience separately for each description of pole within each decay zone if much is to be learned about the important factors influencing pole life.

Tables 3.1 through 3.5 show, for each description of pole, the number originally purchased and the number and percent permanently removed or stubbed during the 13 years of the study. The removals are further broken down according to reported cause. These tables reflect the wide variation in experience between decay zones, particularly between Zones 4 and 5 as compared with Zones 1, 2 and 3. Within each zone, uncertainties in older records and in identification of poles, particularly those produced in earlier years, introduce some degree of error and inconsistency that will be evident in these tables.

In some cases, two or more kinds of poles have been grouped together in Table 3.1 through 3.5. This is done where several small categories of poles, such as those produced in 1946 through 1948 with "alternate" preservatives, reflect variations in experience that show no consistent relationship to the kind of preservative or method of treatment.

REA pole specifications have been changed from time to time in light of the variations in experience shown in Tables 3.1 through 3.5. These tables give continuing evidence of the importance of strict adherence to specifications, including the requirement for independent inspection unless insured warranty (IW) poles are specified.

TABLE 2.1 DECAY ZONE 1
NUMBER OF POLES OWNED AND CASUALTIES EACH YEAR BY CAUSE
1951 through 1963

1	2	Number of casualties and annual casualty rate due to each cause																			
	Poles	3 All Causes		Decay				6 Lightning		7 Sleet, snow		8 Wind		9 Woodpecker		10 Mechanical		No damage		12 Misc.	
				4 All		5 Off															
Year	owned **	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1951	318375	299	0.09	22	0.01	* 4	0.001*	16	0.01	1	0.00	11	0.00	0	0.00	8	0.00	233	0.07	8	0.00
1952	407511	312	0.08	22	0.01	* 4	0.001*	18	0.00	2	0.00	24	0.01	1	0.00	6	0.00	226	0.06	13	0.00
1953	446926	387	0.09	255	0.06	* 5	0.001*	7	0.00	8	0.00	3	0.00	1	0.00	3	0.00	102	0.02	8	0.00
1954	475793	628	0.13	251	0.05	* 35	0.007*	13	0.00	9	0.00	13	0.00	1	0.00	5	0.00	329	0.07	7	0.00
1955	501894	1415	0.28	518	0.10	* 56	0.011*	20	0.00	0	0.00	5	0.00	1	0.00	6	0.00	860	0.17	5	0.00
1956	518522	2822	0.54	1013	0.20	* 189	0.036*	30	0.01	690	0.13	17	0.00	0	0.00	9	0.00	1055	0.20	8	0.00
1957	527464	2017	0.38	1302	0.25	* 67	0.013*	31	0.01	1	0.00	11	0.00	2	0.00	10	0.00	653	0.12	7	0.00
1958	538929	1877	0.35	1261	0.23	* 263	0.049*	38	0.01	1	0.00	24	0.00	21	0.00	17	0.00	499	0.09	16	0.00
1959	550343	3090	0.56	2222	0.40	* 117	0.021*	25	0.00	21	0.00	9	0.00	9	0.00	15	0.00	784	0.14	5	0.00
1960	559176	2462	0.44	1455	0.26	* 90	0.016*	69	0.01	11	0.00	18	0.00	3	0.00	25	0.00	870	0.16	11	0.00
1961	566978	2753	0.49	1066	0.19	* 227	0.040*	45	0.01	347	0.06	417	0.07	17	0.00	35	0.01	784	0.14	42	0.01
1962	576682	1874	0.32	972	0.17	* 186	0.032*	114	0.02	113	0.02	95	0.02	13	0.00	66	0.01	442	0.08	59	0.01
1963	587575	2685	0.46	1488	0.25	* 279	0.047*	122	0.02	18	0.00	45	0.01	3	0.00	101	0.02	741	0.13	167	0.03
ALL YEARS		23021		11861		*1522*		615		1222		728		77		311		7821		386	

**at start of year.
*----*Figures between asterisks are included in preceding column.

TABLE 2.2 DECAY ZONE 2
NUMBER OF POLES OWNED AND CASUALTIES EACH YEAR BY CAUSE
1951 through 1963

1	2	Number of casualties and annual casualty rate due to each cause																					
		3		Decay				6		7		8		9		10		11		12			
Year	Poles owned	All Causes		4 All		5 Off		Lightning		Sleet, snow		Wind		Woodpecker		Mechanical		No damage		Misc.			
	**	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.		
1951	392753	142	0.04	52	0.04	* 43	0.011*	19	0.00	1	0.00	1	0.00	1	0.00	5	0.00	62	0.02	1	0.00		
1952	405713	139	0.03	15	0.00	* 4	0.001*	10	0.00	0	0.00	1	0.00	2	0.00	5	0.00	106	0.03	0	0.00		
1953	417992	288	0.07	36	0.01	* 2	0.001*	13	0.00	0	0.00	0	0.00	1	0.00	1	0.00	236	0.06	1	0.00		
1954	428118	442	0.10	55	0.01	* 12	0.003*	28	0.01	53	0.00	8	0.00	0	0.00	1	0.00	191	0.04	106	0.02		
1955	432303	437	0.10	171	0.04	* 14	0.003*	31	0.01	0	0.00	1	0.00	2	0.00	3	0.00	228	0.05	1	0.00		
1956	438015	878	0.20	352	0.08	* 25	0.006*	48	0.01	17	0.00	7	0.00	24	0.01	10	0.00	415	0.09	5	0.00		
1957	445976	882	0.20	307	0.07	* 69	0.015*	67	0.02	0	0.00	3	0.00	26	0.01	23	0.01	451	0.10	5	0.00		
1958	451286	1814	0.40	889	0.20	* 38	0.008*	79	0.02	39	0.01	4	0.00	53	0.01	18	0.00	720	0.16	12	0.00		
1959	457788	2364	0.52	1061	0.23	* 73	0.016*	95	0.02	2	0.00	8	0.00	17	0.00	26	0.01	1126	0.25	29	0.01		
1960	463585	2145	0.46	1101	0.24	* 70	0.015*	139	0.03	3	0.00	3	0.00	8	0.00	30	0.01	843	0.18	18	0.00		
1961	469973	3629	0.77	2445	0.52	* 46	0.010*	139	0.03	4	0.00	5	0.00	25	0.01	72	0.02	897	0.19	43	0.01		
1962	475624	4857	1.02	3764	0.79	* 89	0.019*	105	0.02	1	0.00	17	0.00	17	0.00	212	0.04	695	0.15	46	0.01		
1963	479297	5588	1.17	3169	0.66	* 60	0.013*	249	0.05	532	0.11	3	0.00	14	0.00	46	0.01	1514	0.32	61	0.01		
ALL YEARS		26890		13417		* 545*		1021		652		61		190		452		10769		328			

**at start of year.
*----*Figures between asterisks are included in preceding column.

TABLE 2.3 DECAY ZONE 3
NUMBER OF POLES OWNED AND CASUALTIES EACH YEAR BY CAUSE
1951 through 1963

1	2	Number of casualties and annual casualty rate due to each cause.																					
		3 All Causes		Decay				6 Lightning		7 Sleet, snow		8 Wind		9 Woodpecker		10 Mechanical		11 No damage		12 Misc.	
				4 All		5 Off															
Year	Poles owned **	no.	pct	no.	pct.	no.	pct.	no.	pct.	no.	pct.	No.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1951	819102	1310	0.16	621	0.08	* 98	0.012*	75	0.01	10	0.00	55	0.01	21	0.00	31	0.00	480	0.06	17	0.00
1952	893596	1670	0.19	879	0.10	* 140	0.016*	98	0.01	12	0.00	23	0.00	31	0.00	38	0.00	569	0.06	20	0.00
1953	930001	1617	0.17	674	0.07	* 51	0.005*	131	0.01	33	0.00	36	0.00	42	0.00	55	0.01	604	0.06	42	0.00
1954	965070	2478	0.26	1303	0.14	* 149	0.015*	189	0.02	83	0.01	51	0.01	38	0.00	75	0.01	664	0.07	75	0.01
1955	989217	3089	0.31	1696	0.17	* 148	0.015*	186	0.02	131	0.01	103	0.01	63	0.01	102	0.01	680	0.07	128	0.01
1956	1007845	4008	0.40	2073	0.21	* 287	0.028*	289	0.03	165	0.02	128	0.01	116	0.01	121	0.01	975	0.10	141	0.01
1957	1028210	3842	0.37	1469	0.14	* 260	0.025*	221	0.02	59	0.01	114	0.01	104	0.01	81	0.01	1739	0.17	55	0.01
1958	1043392	4287	0.41	1671	0.16	* 285	0.027*	296	0.03	35	0.00	97	0.01	119	0.01	112	0.01	1876	0.18	81	0.01
1959	1058168	3649	0.34	1384	0.13	* 284	0.027*	228	0.02	57	0.01	76	0.01	129	0.01	94	0.01	1609	0.15	72	0.01
1960	1075398	6058	0.56	2364	0.22	* 359	0.033*	221	0.02	62	0.01	101	0.01	138	0.01	136	0.01	2873	0.27	163	0.02
1961	1090023	7498	0.69	2857	0.26	* 424	0.039*	279	0.03	44	0.00	128	0.01	197	0.02	220	0.02	3683	0.34	90	0.01
1962	1106574	8832	0.80	2712	0.25	* 324	0.029*	278	0.03	13	0.00	291	0.03	180	0.02	230	0.02	4936	0.45	192	0.02
1963	1123580	9453	0.84	2661	0.24	* 252	0.022*	390	0.03	18	0.00	116	0.01	349	0.03	232	0.02	5386	0.48	301	0.03
ALL YEARS		59854		22592		*3111*		2881		722		1319		1527		1527		27909		1377	

**at start of year.
*----*Figures between asterisks are included in preceding column.

TABLE 2.4 DECAY ZONE 4
NUMBER OF POLES OWNED AND CASUALTIES EACH YEAR BY CAUSE
1951 through 1963

1	2	Number of casualties and annual casualty rate due to each cause.																					
		3 All Causes		Decay				6 Lightning		7 Sleet, snow		8 Wind		9 Woodpecker		10 Mechanical		11 No damage		12 Misc.	
				4 All		5 Off															
Year	Poles owned																				
	**	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1951	674146	1540	0.23	482	0.07	* 6	0.001*	79	0.01	10	0.00	38	0.01	90	0.01	33	0.00	803	0.12	5	0.00
1952	736773	1572	0.21	600	0.08	* 26	0.004*	77	0.01	14	0.00	60	0.01	42	0.01	36	0.00	736	0.10	7	0.00
1953	793703	2244	0.28	916	0.12	* 7	0.001*	97	0.01	14	0.00	54	0.01	55	0.01	68	0.01	1010	0.13	30	0.00
1954	829426	5578	0.67	1255	0.15	* 11	0.001*	127	0.02	7	0.00	88	0.01	70	0.01	76	0.01	3910	0.47	45	0.01
1955	861788	11558	1.34	1353	0.16	* 51	0.006*	121	0.01	17	0.00	61	0.01	132	0.02	52	0.01	9818	1.14	4	0.00
1956	879320	7372	0.84	1578	0.18	* 37	0.004*	129	0.01	59	0.01	119	0.01	174	0.02	61	0.01	5243	0.60	9	0.00
1957	890960	6042	0.68	1645	0.18	* 19	0.002*	126	0.01	5	0.00	87	0.01	220	0.02	73	0.01	3878	0.44	8	0.00
1958	904209	5348	0.59	2024	0.22	* 57	0.006*	115	0.01	11	0.00	82	0.01	220	0.02	57	0.01	2831	0.31	8	0.00
1959	918450	6526	0.71	2324	0.25	* 108	0.012*	122	0.01	20	0.00	93	0.01	230	0.03	76	0.01	3649	0.40	12	0.00
1960	934923	7950	0.85	2516	0.27	* 93	0.010*	85	0.01	836	0.09	69	0.01	120	0.01	61	0.01	4248	0.45	15	0.00
1961	952980	9399	0.99	4246	0.45	* 374	0.039*	62	0.01	0	0.00	131	0.01	243	0.03	93	0.01	4594	0.48	30	0.00
1962	975217	9086	0.93	4000	0.41	* 470	0.048*	81	0.01	31	0.00	52	0.01	296	0.03	85	0.01	4403	0.45	138	0.01
1963	993159	9191	0.93	5099	0.51	* 412	0.041*	88	0.01	0	0.00	22	0.00	379	0.04	122	0.01	3396	0.34	85	0.01
ALL YEARS		83903		28188		*1671*		1369		1024		956		2339		925		48703		399	

**at start of year.
*-----*Figures between asterisks are included in preceding column.

TABLE 2.5 DECAY ZONE 5
NUMBER OF POLES OWNED AND CASUALTIES EACH YEAR BY CAUSE
1951 through 1963

1	2	Number of casualties and annual casualty rate due to each cause																			
		3 All Causes		Decay				6 Lightning		7 Sleet, snow		8 Wind		9 Woodpecker		10 Mechanical		11 No damage		12 Misc.	
				4 All		5 Off															
Year	Poles owned	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
	**																				
1951	192866	675	0.35	150	0.08	* 7	0.004*	35	0.02	7	0.00	0	0.00	34	0.02	9	0.00	382	0.20	58	0.03
1952	209923	987	0.47	618	0.29	* 25	0.012*	73	0.03	10	0.00	17	0.01	42	0.02	11	0.01	185	0.09	31	0.01
1953	221981	1096	0.49	756	0.34	* 12	0.005*	51	0.02	14	0.01	10	0.00	58	0.03	7	0.00	183	0.08	17	0.01
1954	232484	1312	0.56	868	0.37	* 12	0.005*	38	0.02	0	0.00	65	0.03	53	0.02	15	0.01	260	0.11	13	0.01
1955	244327	2390	0.98	1658	0.68	* 11	0.005*	99	0.04	10	0.00	45	0.02	79	0.03	14	0.01	452	0.18	33	0.01
1956	254700	1751	0.69	1181	0.46	* 66	0.026*	62	0.02	0	0.00	18	0.01	72	0.03	25	0.01	387	0.15	6	0.00
1957	263916	3097	1.17	2478	0.94	* 50	0.019*	43	0.02	0	0.00	18	0.01	71	0.03	16	0.01	455	0.17	16	0.01
1958	271225	2351	0.87	1662	0.61	* 33	0.012*	71	0.03	0	0.00	6	0.00	39	0.01	27	0.01	543	0.20	3	0.00
1959	280423	2509	0.89	1565	0.56	* 41	0.015*	45	0.02	0	0.00	17	0.01	87	0.03	34	0.01	752	0.27	9	0.00
1960	290669	3318	1.14	2317	0.80	* 150	0.052*	33	0.01	0	0.00	115	0.04	41	0.01	47	0.02	741	0.25	24	0.01
1961	300559	4817	1.60	1925	0.64	* 176	0.059*	56	0.02	4	0.00	68	0.02	204	0.07	57	0.02	2474	0.82	29	0.01
1962	309770	6574	2.12	2515	0.81	* 144	0.046*	96	0.03	0	0.00	18	0.01	394	0.13	66	0.02	3289	1.06	196	0.06
1963	318310	5549	1.74	2150	0.68	* 103	0.032*	69	0.02	0	0.00	24	0.01	365	0.11	59	0.02	2812	0.88	70	0.02
ALL YEARS		40317		20333		* 830*		822		48		479		1635		402		16089		509	

**at start of year.
*----*Figures between asterisks are included in preceding column.

TABLE 3.1 DECAY ZONE 1

NUMBER OF POLES PURCHASED AND CASUALTIES BY CAUSE
1951 through 1963
By Vintage, Species, Preservative and Treatment

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)																	
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1937-	SP	C	P	6160	36	.58	96	1.56	4	.06	6	.10	6	.10	9	.15	8	.13	6	.10	171	2.78
1939	LP	C		1890	46	2.43	1	.05			1	.05			2	.11	14	.74	3	.16	67	3.54
	WC	C	T	2265	22	.97									5	.22	1	.04	7	.31	35	1.55
	WC	C	B	30462	167	.55	22	.07	1		45	.15			37	.12	599	1.97	133	.44	1004	3.30
		Other					2		1		8						1		8		20	
		Sub-total		40777	271	.66	121	.30	6	.01	60	.15	6	.01	53	.13	623	1.53	157	.39	1297	3.18
1940-	SP	C	P	4066	7	.17	16	.39	1	.02	4	.10	6	.15	1	.02	17	.42			52	1.27
1942	WC	C	T	237	2	.84									4	1.69					6	2.53
	WC	C	B	22383	86	.38	38	.17			44	.20			34	.15	159	.71	15	.07	376	1.68
		Other		22	14	63.64			1	4.55	3	13.64			1	4.55	3	13.64			22	100.00
		Sub-total		26708	109	.41	54	.20	2	.01	51	.19	6	.02	40	.15	179	.67	15	.06	456	1.71
1943-	SP	C	P	1204	22	1.82	1	.08			25	2.08			2	.17	30	2.49	3	.25	83	6.89
1945	LP	C	P	3143	13	.41	7	.22			9	.29									29	.92
	LP	C	B	235	14	5.95			7	2.98					1	.43	2	.85	1	.43	25	10.64
	WC	C	T	423	1	.24									2	.47	2	.47	1	.24	6	1.42
	WC	C	B	5436	56	1.03	2	.04			19	.35			6	.11	34	.63	5	.09	122	2.24
		Other		360	21	5.83	2	.56			2	.56			1	.28	5	1.39	6	1.67	37	10.28
		Sub-total		10801	127	1.18	12	.11	7	.06	55	.51			12	.11	73	.68	16	.15	302	2.80
1946-	SP	C	P	17582	132	.75	27	.15	26	.15	65	.37	12	.07	11	.06	1259	7.16	16	.09	1548	8.80
1948	SP	ALT	P	2598	16	.62	4	.15	14	.54			3	.12	3	.12	22	.85	1	.04	63	2.42
	LP	C	P	20889	732	3.50	14	.07	1		53	.25			12	.06	229	1.10	3	.01	1044	5.00
	LP	C	T	8466	394	4.65	1	.01	2	.02	4	.05	12	.14	2	.02	7	.08	14	.17	436	5.15
	LP	C	B	19558	2667	13.64	8	.04	8	.04	13	.07			13	.07	195	1.00	14	.07	2918	14.92
	LP	ALT	ALL	19878	1017	5.12	28	.14	10	.05	67	.34	1	.01	6	.03	40	.20	33	.17	1202	6.05
	DF	C	P	25273	78	.31	7	.03	4	.02	74	.29			4	.02	933	3.69	2	.01	1102	4.36
	DF	C	T	253	8	3.16															8	3.16
	DF	P	B	667			2	.30							1	.15					3	.45
	WC	C	B	3885	257	6.61	2	.05			1	.03			9	.23	8	.21	13	.33	290	7.46
	WL	ALL		1643	19	1.16									1	.06	29	1.77			49	2.98
		Other		944	475	50.32	1	.11	21	2.22							1	.11			498	52.75
		Sub-total		121636	5795	4.76	94	.08	86	.07	277	.23	28	.02	62	.05	2723	2.24	96	.08	9161	7.53

* SPECIES

SP	Southern pine	WL	Western larch (tamarack)
LP	Lodgepole pine	NP	Northern pine (jack pine; red pine)
DF	Douglas fir	EC	Northern white cedar (eastern cedar)
WC	Western red cedar	WP	Western pine (ponderosa)

PRESERVATIVES

C	Creosote
P	Pentachlorophenol
A	Creosote with penta additive
ALT.	Alternate preservative used in early post-war years
ALL	Includes all preservatives

TREATMENT

P	Pressure
T	Thermal
B	Butt
ALL	Includes all treatments

TABLE 3.1 - Cont.

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1949-1951	SP	C	P	44623	121	.27	66	.15	19	.04	17	.04	2		9	.02	423	.95	9	.02	666	1.49
	SP	P	P	3015	1	.03	3	.10			1	.03					7	.23			12	.40
	LP	C	P	61980	1924	3.10	65	.10	595	.96	86	.14	31	.05	15	.02	887	1.43	5	.01	3608	5.82
	LP	C	T	3557	31	.87	2	.06							1	.03	1	.03	10	.28	45	1.27
	LP	C	B	1990	389	19.55	5	.25	5	.25	3	.15							2	.10	404	20.30
	LP	P	P	24062	55	.23	12	.05			6	.02	1		6	.02	180	.75	17	.07	277	1.15
	LP	P	T	4442	14	.32	1	.02	1	.02					1	.02	32	.72	3	.07	52	1.17
	LP	P	B	8240	276	3.35	2	.02	3	.04			1	.01	4	.05	3	.04	6	.07	295	3.58
	LP	ALT	ALL	27044	1794	6.63	21	.08	4	.01	104	.38			2	.01	86	.32	9	.03	2020	7.47
	DF	C	P	21216	19	.09	7	.03	2	.01	10	.05			4	.02	138	.65	9	.04	189	.89
	WC	C	B	3519	5	.14			1	.03	7	.20					5	.14	1	.03	19	.54
	WL	ALL	ALL	1245	3	.24	2	.16													5	.40
		Other		442	8	1.81	2	.45							3	.68	8	1.81			21	4.75
		Sub-total		205375	4640	2.26	188	.09	630	.31	234	.11	35	.02	45	.02	1770	.86	71	.03	7613	3.71
1952-1954	SP	C	P	17738	13	.07	30	.17			7	.04			3	.02	103	.58	3	.02	159	.90
	SP	P	P	416													7	1.68			7	1.68
	LP	C	P	30844	339	1.10	18	.06			36	.12	1		10	.03	328	1.06	4	.01	736	2.39
	LP	C	T	1478	7	.47									2	.13	1	.07	1	.07	11	.74
	LP	C	B	7434	289	3.88	12	.16	269	3.62					3	.04	3	.04			576	7.74
	LP	P	P	18259	20	.11	5	.03	13	.07	5	.03			8	.04	11	.06	1	.01	63	.35
	LP	P	T	112	1	.89															1	.89
	LP	P	B	3001	31	1.03															31	1.03
	DF	C	P	3823	1	.03	4	.10	21	.55					4	.10	26	.68	1	.03	57	1.49
	DF	P	P	4371			1	.02	7	.16					2	.05	1	.02	1	.02	12	.27
	WC	C	B	1384	4	.29	4	.29	14	1.01					2	.14	1	.07			25	1.81
	WC	P	T	3080			1	.03	69	2.24					1	.03					71	2.31
	WC	P	B	986			1	.10													1	.10
	WL	C	ALL	1143			10	.87							1	.09	105	9.19			116	10.15
	WL	P	ALL	1637	5	.31	2	.12	3	.18					1	.06	1	.06	1	.06	13	.79
		Other		4													1	25.00			1	25.00
		Sub-total		95710	710	.74	88	.09	396	.41	48	.05	1		37	.04	588	.61	12	.01	1880	1.96
1955-1957	SP	C	P	9322	4	.04	6	.06	8	.09			1	.01	1	.01	114	1.22	3	.03	137	1.47
	SP	P	P	778															1	.13	1	.13
	LP	C	P	8200	21	.26			8	.10	1	.01			3	.04	125	1.52	4	.05	162	1.98
	LP	C	T	68																		
	LP	C	B	180	6	3.33											1	.56			7	3.89
	LP	P	P	13101	3	.02	10	.08					1	.01	2	.02	125	.95	2	.02	143	1.09
	LP	P	T	527	1	.19									1	.19			3	.57	5	.95
	LP	P	B	827																		
	DF	C	P	1197	1	.08									1	.08	25	2.09	1	.08	28	2.34
	DF	P	P	1698			2	.12							1	.06					3	.18
	DF	P	T	576					1	.17											1	.17
	WC	C	B	3942			3	.08									11	.28			14	.36
	WC	P	P	78																		
	WC	P	T	1600			1	.06									3	.19			4	.25

TABLE 3.1 - Cont.

Vintage years	Species *	Pre-serv-ative *	Treat-ment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
	WC	P	B	316																
	WL	C	P	141																
	WL	P	P	653			8	1.23											8	1.23
	Other			185			1	.54											1	.54
	Sub-total			43389	36	.08	31	.07	17	.04	1		2		9	.02	404	.93	14	.03	514	1.18
1958-1960	SP	C	P	4491	16	.36	1	.02	1	.02					2	.04	20	.45	1	.02	41	.91
	SP	A	P	370													15	4.05			15	4.05
	SP	P	P	1427	1	.07	3	.21			1	.07			1	.07	91	6.38			97	6.80
	LP	C	P	1731	2	.12	3	.17	19	1.10					1	.06	3	.17			28	1.62
	LP	C	T	151																		
	LP	C	B	180	1	.56	1	.56													2	1.11
	LP	P	P	10701	3	.03	2	.02	43	.40					2	.02	155	1.45			205	1.92
	LP	P	T	3134	7	.22									5	.16	5	.16	3	.10	20	.64
	DF	C	P	1461													13	.89			13	.89
	DF	P	P	883											1	.11					1	.11
	DF	P	T	1360					1	.07							4	.29			5	.37
	WC	C	T	18																		
	WC	C	B	3173			7	.22							3	.09	13	.41	2	.06	25	.79
	WC	P	P	125													4	3.20			4	3.20
	WC	P	T	6926	1	.01	2	.03							1	.01	26	.38			30	.43
	WC	P	B	328																		
	WL	P	P	807																		
	WL	P	T	250																		
	Sub-total			37516	31	.08	19	.05	64	.17	1				16	.04	349	.93	6	.02	486	1.30
1961-1963	SP	C	P	3256													76	2.33			76	2.33
	SP	A	P	1317													9	.68			9	.68
	SP	P	P	100													2	2.00			2	2.00
	LP	C	P	188													58	30.85			58	30.85
	LP	A	P	251																		
	LP	P	P	10958					12	.11					25	.23	55	.50	1	.01	93	.85
	LP	P	T	2332													1	.04			1	.04
	LP	P	B	26																		
	DF	C	P	2289			1	.04									34	1.49			35	1.53
	DF	P	P	1467													15	1.02			15	1.02
	DF	P	T	508					2	.39											2	.39
	WC	C	B	9938			1	.01									36	.36			37	.37
	WC	A	B	189																		
	WC	P	P	666																		
	WC	P	T	4413			1	.02			1	.02			1	.02	13	.29			16	.36
	WC	P	B	741																		
	WL	P	ALL	1267													27	2.13			27	2.13
	Other			18																		
	Sub-total			39924			3	.01	14	.04	1				26	.07	326	.82	1		371	.93
	TOTAL			621836	11719		610		1222		728		78		300		7035		388		22080	

*See explanation of codes on first page of Table 3.1.

TABLE 3.2 DECAY ZONE 2

NUMBER OF POLES PURCHASED AND CASUALTIES BY CAUSE
1951 through 1963
By Vintage, Species, Preservative and Treatment

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1937-1939	SP	C	P	92727	584	.63	616	.66	3		12	.01	74	.08	74	.08	4743	5.11	27	.03	6133	6.61
	WC	C	B	15212	220	1.45	24	.16					4	.03	9	.06	159	1.05	13	.09	429	2.82
	EC	Untreated		1374	56	4.08	1	.07			5	.36	9	.66	23	1.67	6	.44	1	.07	101	7.35
		Other			14		1				1		1				3		3		23	
		Sub-total		109313	874	.80	642	.59	3		18	.02	88	.08	106	.10	4911	4.49	44	.04	6686	6.12
1940-1942	SP	C	P	29644	110	.37	76	.26	3	.01	4	.01	30	.10	22	.07	1329	4.48	13	.04	1587	5.35
	WC	C	B	24613	586	2.38	43	.17			1		5	.02	19	.08	271	1.10	45	.18	970	3.94
		Other		1149	11	.96	1	.09	38	3.31			4	.35	2	.17	1	.09	1	.09	58	5.05
		Sub-total		55406	707	1.28	120	.22	41	.07	5	.01	39	.07	43	.08	1601	2.89	59	.11	2615	4.72
1943-1945	SP	C	P	18716	68	.36	25	.13	1	.01	2	.01	6	.03	5	.03	783	4.18	3	.02	893	4.77
	LP	C	B	1921	338	17.59							1	.05							339	17.65
	LP	P	B	115	16	13.91															16	13.91
	DF	C	P	678									1	.15			16	2.36			17	2.51
	WC	C	B	6187	79	1.28	16	.26			1	.02			2	.03	112	1.81	17	.27	227	3.67
	WC	P	T	753	1	.13	1	.13									1	.13			3	.40
	WC	P	B	1272									1	.08			6	.47			7	.55
	EC	Untreated		465	17	3.66							2	.43	2	.43	2	.43			23	4.95
		Other			3								1		1				1		6	
		Sub-total		30107	522	1.73	42	.14	1		3	.01	12	.04	10	.03	920	3.06	21	.07	1531	5.09
1946-1948	SP	C	P	52583	647	1.23	74	.14	17	.03	14	.03	21	.04	42	.08	1162	2.21	13	.02	1990	3.78
	SP	P	P	530	6	1.13															6	1.13
	SP	ALT	P	1630	21	1.29	2	.12									508	31.17	1	.06	532	32.64
	LP	C	P	3656	46	1.26	1	.03									54	1.48	1	.03	102	2.79
	LP	C	T	6034	630	10.44	10	.17	3	.05					3	.05	59	.98	6	.10	711	11.78
	LP	C	B	12259	8813	67.81	5	.04			6	.05			1	.01	37	.30	1	.01	8363	68.22
	LP	ALT	ALL	6858	562	8.19	7	.10	389	5.67	1	.01	1	.01	2	.03	108	1.57			1070	15.60
	LP	P	B	1160	488	42.07	1	.09													489	42.16
	DF	C	P	20389	22	.11	6	.03	80	.39	1		2	.01	1		100	.49			212	1.04
	DF	C	T	745					1	.13					1	.13	4	.54			6	.81
	WC	C	B	14466	218	1.51	31	.21	2	.01	3	.02	7	.05	12	.08	127	.88	52	.36	452	3.12
	WC	P	B	2132	4	.19	4	.19									4	.19			12	.56
	WL	C	P	500	1	.20	1	.20													2	.40
	NP	C	P	2595	1	.04									1	.04					2	.08
	NP	ALT	P	1124	1	.09							1	.09			67	5.96			69	6.14
		Other		1764	40	2.27			2	.11	2	.11	1	.06	4	.23	17	.96	1	.06	67	3.80
		Sub-total		128425	11000	8.57	142	.11	494	.38	27	.02	33	.03	67	.05	2247	1.75	75	.06	14085	10.97

*See explanation of codes on first page of Table 3.1.

TABLE 3.2 - Cont.

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1949-	SP	C	P	37260	55	.15	12	.03					6	.02	12	.03	403	1.08	3	.01	491	1.32
1951	LP	C	P	916	32	3.49	4	.44	2	.21	1	.11	1	.11	1	.11					41	4.48
	LP	C	T	400	103	25.75	1	.25									1	.25			105	26.25
	LP	P	T	150			1	.67							1	.67					2	1.33
	DF	C	P	8156	3	.04	14	.17	4	.05			1	.01	1	.01	6	.07	1	.01	30	.37
	DF	P	P	56																		
	WC	C	B	34271	31	.09	18	.05	67	.20	5	.01	9	.03	8	.02	17	.05	13	.04	168	.49
	WC	P	P	340			2	.59													2	.59
	WL	C	P	3282					40	1.22	2	.06									42	1.28
	EC	P	T	565																		
	EC	None		493											2	.41					2	.41
		Other			27		4						1		1		2				35	
		Sub-total		85889	251	.29	56	.07	113	.13	8	.01	18	.02	26	.03	429	.50	17	.02	918	1.07
1952-	SP	C	P	14072	4	.03	5	.04							4	.03	186	1.32	35	.25	234	1.66
1954	LP	C	P	532	1	.19															1	.19
	LP	C	T	914																		
	LP	P	T	1352											1	.07			1	.07	2	.15
	DF	C	P	104															70	67.31	70	67.31
	WC	C	B	8404			4	.05							3	.04			2	.02	9	.11
	WC	P	P	184	1	.54	1	.54													2	1.09
	WC	P	T	261															1	.38	1	.38
	WC	P	B	155																		
	WL	P	T	1481											1	.07					1	.07
		Sub-total		27459	6	.02	10	.04							9	.03	186	.68	109	.40	320	1.17
1955-	SP	C	P	11071	3	.03	1	.01							5	.05	124	1.12	2	.02	135	1.22
1957	SP	P	P	2104													77	3.66			77	3.66
	LP	P	T	2496											2	.08					2	.08
	DF	P	T	156																		
	WC	C	B	375	1	.27													1	.27	2	.53
	WC	P	P	589													1	.17			1	.17
	WC	P	T	3464																		
	WC	P	B	80																		
	WL	P	T	275	1	.36															1	.36
	NP	C	P	450																		
	NP	P	P	120																		
		Other													1		1				2	
		Sub-total		21180	5	.02	1								8	.04	203	.96	3	.01	220	1.04

*See explanation of codes on first page of Table 3.1.

TABLE 3.2 - Cont.

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1958-1960	SP	C	P	7282	1	.01	1	.01							17	.23	14	.19			33	.45
	SP	P	P	4351													146	3.36			146	3.36
	LP	P	T	2396											2	.08					2	.08
	DF	P		130																		
	WC	P	P	139																		
	WC	P	T	7014											1	.01					1	.01
	WC	P	B	86																		
	WL	P	P	104																		
	WL	P	T	3036			1	.03													1	.03
	NP	P	P	472													7	1.48			7	1.48
	Other																1				1	
	Sub-total			25010	1		2	.01							20	.08	168	.67			191	.76
1961-1963	SP	C	P	5732													47	.82			47	.82
	SP	A	P	182													3	1.65			3	1.65
	SP	P	P	2782																		
	LP	C	T	111																		
	LP	P	T	4916																		
	DF	C	P	78																		
	DF	P	P	320													14	4.38			14	4.38
	DF	P	T	11865											116	.98	16	.13			132	1.11
	WL	P	T	2750											41	1.49					41	1.49
	NP	C	P	734											3	.41	6	.82			9	1.23
	NP	P	P	198													9	4.55			9	4.55
	NP	P	T	136																		
	Other			7											1	14.29	2	28.57			3	42.86
	Sub-total			29811											161	.54	97	.33			258	.87
	TOTAL			512600	13366		1015		652		61		190		450		10762		328		26824	

*See explanation of codes on first page of Table 3.1.

TABLE 3.3 DECAY ZONE 3

NUMBER OF POLES PURCHASED AND CASUALTIES BY CAUSE
1951 through 1963
By Vintage, Species, Preservative and Treatment

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1937-1939	SP	C	P	186832	5895	3.16	944	.51	48	.03	334	.18	463	.25	306	.16	7954	4.26	280	.15	16224	8.68
	WC	C	B	23278	2922	12.55	48	.21	243	1.04	122	.52			149	.64	38	.16	244	1.05	3766	16.18
	WC	ALT	ALL	911	917	100.66															917	100.66
		Other			120		24				14		2		11		8		9		188	
		Sub-total		211021	9854	4.67	1016	.48	291	.14	470	.22	465	.22	466	.22	8000	3.79	533	.25	21095	10.00
1940-1942	SP	C	P	145574	2758	1.89	385	.26	49	.03	261	.18	286	.20	201	.14	4874	3.35	89	.06	8903	6.12
	DF	C	B	128	30	23.44					1	.78							1	.78	32	25.00
	WC	C	B	17411	840	4.82	224	1.29	250	1.44	15	.09			95	.55	108	.62	242	1.39	1774	10.19
		Other			35												22				57	
		Sub-total		163113	3663	2.25	609	.37	299	.18	277	.17	286	.18	296	.18	5004	3.07	332	.20	10766	6.60
1943-1945	SP	C	P	54278	989	1.82	123	.23	14	.03	85	.16	105	.19	65	.12	1833	3.38	32	.06	3246	5.98
	SP	P	P	359	5	1.39															5	1.39
	LP	C	B	2239	2	.09	1	.04													3	.13
	DF	C	P	519	8	1.54	3	.58					4	.77	1	.19	7	1.35	1	.19	24	4.62
	WC	C	T	190																		
	WC	C	B	4736	139	2.93	52	1.10	43	.91	16	.34	11	.23	17	.36			42	.89	320	6.76
	WL	C	B	2000	41	2.05	33	1.65	1	.05											75	3.75
		Other			38		1				3						12		1		55	
		Sub-total		64321	1222	1.90	213	.33	58	.09	104	.16	120	.19	83	.13	1852	2.88	76	.12	3728	5.80
1946-1948	SP	C	P	166771	2974	1.78	405	.24	19	.01	271	.16	292	.18	223	.13	3784	2.27	131	.08	8099	4.86
	SP	ALT	P	15172	1546	10.19	12	.08			6	.04	24	.16	7	.05	13	.09	1	.01	1609	10.61
	SP	P	P	7035	19	.27	4	.06					1	.01	3	.04	12	.17	3	.04	42	.60
	LP	C	B	2131	543	25.48	5	.23					2	.09	22	1.03			4	.19	576	27.03
	LP	P	P	1505	2	.13	5	.33					2	.13			100	6.64			109	7.24
	LP	All Other		524	13	2.48	9	1.72	13	2.48			30	5.73	1	.19			3	.57	69	13.17
	DF	C	P	4117	20	.49	4	.10	4	.10	1	.02	4	.10	4	.10	24	.58	5	.12	66	1.60
	DF	P	P	684													10	1.46			10	1.46
	DF	All Other			18		1														19	
	WC	C	B	19325	787	4.07	30	.16	11	.06	16	.08	8	.04	21	.11	1	.01	13	.07	887	4.59
	WL	C	B	1298	394	30.35	7	.54	1	.08			3	.23	17	1.31	2	.15			424	32.67
	WL	P	B	899	36	4.00															36	4.00
		Other			86		2				19						32		20		159	
		Sub-total		219461	6438	2.93	484	.22	48	.02	313	.14	366	.17	298	.14	3978	1.81	180	.08	12105	5.52

*See explanation of codes on first page of Table 3.1.

TABLE 3.3 - Cont.

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1949-1951	SP	C	P	216193	579	.27	356	.16	6		58	.03	107	.05	150	.07	1645	.76	94	.04	2995	1.39
	SP	P	P	3019	1	.03											16	.53			17	.56
	DF	C	P	1967	66	3.36					1	.05	2	.10	2	.10	25	1.27	3	.15	99	5.03
	DF	P	P	3364	2	.06									25	.74					27	.80
	WC	C	B	8379	22	.26	15	.18	9	.11			5	.06	8	.10			10	.12	69	.82
	WC	P	B	400					1	.25									2	.50	3	.75
	Other				179										1				4		184	
	Sub-total			233322	849	.36	371	.16	16	.01	59	.03	114	.05	186	.08	1686	.72	113	.05	3394	1.45
1952-1954	SP	C	P	84240	75	.09	62	.07	2		33	.04	29	.03	58	.07	1074	1.27	12	.01	1345	1.60
	SP	P	P	1954													8	.41			8	.41
	LP	C	T	723											1	.14			1	.14	2	.28
	DF	C	P	234							1	.43			1	.43	4	1.71			6	2.56
	DF	P	P	2784							1	.04			4	.14			2	.07	7	.25
	WC	C	T	2378																		
	WC	C	B	5789	34	.59	7	.12	1	.02					11	.19	2	.03	3	.05	58	1.00
	WC	P	B	3284	10	.30			5	.15									1	.03	16	.49
	Other				8										1		1				10	
	Sub-total			101386	127	.13	69	.07	8	.01	35	.03	29	.03	76	.07	1089	1.07	19	.02	1452	1.43
1955-1957	SP	C	P	50420	12	.02	28	.06			33	.07	31	.06	36	.07	808	1.60	7	.01	955	1.89
	SP	P	P	4355			3	.07									2	.05			5	.11
	DF	C	P	270							2	.74			1	.37	1	.37			4	1.48
	DF	P	P	1495	1	.07					2	.13			7	.47					10	.67
	DF	P	T	1550																		
	WC	C	B	3180	2	.06	1	.03							8	.25	12	.38	3	.09	26	.82
	WC	P	T	2055																		
	WC	P	B	1749																		
	Other			40	1	2.50			1	2.50			1	2.50	2	5.00			1	2.50	6	15.00
	Sub-total			65114	16	.02	32	.05	1		37	.06	32	.05	54	.08	823	1.26	11	.02	1006	1.54
1958-1960	SP	C	P	40932	7	.02	15	.04			20	.05	7	.02	34	.08	1232	3.01	9	.02	1324	3.23
	SP	P	P	8420			1	.01							1	.01	80	.95			82	.97
	DF	C	P	310													1	.32			1	.32
	DF	P	P	1813											2	.11			2	.11	4	.22
	WC	C	T	4017															1	.02	1	.02
	WC	C	B	231											3	1.30	2	.87			5	2.16
	WC	P	T	3707													3	.08	1	.03	4	.11
	WC	P	B	896																		
	WL	P	T	209																		
	Other			90			1	1.11			1	1.11			1	1.11					3	3.33
	Sub-total			60625	7	.01	17	.03			21	.03	7	.01	41	.07	1318	2.17	13	.02	1424	2.35

*See explanation of codes on first page of Table 3.1.

TABLE 3.3 - Cont.

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)													
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1961-1963	SP	C	P	51338			4	.01			1				16	.03	662	1.29	93	.18	776	1.51
	SP	A	P	1450													7	.48			7	.48
	SP	P	P	13651													374	2.74			374	2.74
	DF	C	P	455																		
	DF	P	P	1768							1	.06			1	.06	30	1.70			32	1.81
	WC	C	B	1080																		
	WC	P	P	1315													4	.30			4	.30
	WC	P	T	8034													39	.49			39	.49
	WC	P	B	390																		
	WL	P	T	98																		
	Sub-total			79579			4	.01			2				17	.02	1116	1.40	93	.12	1232	1.55
	TOTAL			1197942	22176		2815		721		1318		1419		1517		24866		1370		56202	

*See explanation of codes on first page of Table 3.1.

TABLE 3.4 DECAY ZONE 4

NUMBER OF POLES PURCHASED AND CASUALTIES BY CAUSE
1951 through 1963
By Vintage, Species, Preservative and Treatment

Vintage years	Species *	Preservative *	Treatment *	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)															
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
					no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1937-1939	SP	C	P	108753	6997	6.43	249	.23	71	.07	126	.12	396	.36	142	.13	15976	14.69	104	.10	24061	22.12
		Other			8												11				19	
		Sub-total		108753	7005	6.44	249	.23	71	.07	126	.12	396	.36	142	.13	15987	14.70	104	.10	24080	22.14
1940-1942	SP	C	P	117365	4739	4.04	226	.19	118	.10	107	.09	328	.28	142	.12	10692	9.11	45	.04	16397	13.97
		Other			8												5				13	
		Sub-total		117365	4747	4.04	226	.19	118	.10	107	.09	328	.28	142	.12	10697	9.11	45	.04	16410	13.98
1943-1945	SP	C	P	31376	1497	4.77	72	.23	45	.14	89	.28	245	.78	57	.18	1142	3.64	24	.08	3171	10.11
		Other			98						1		5								104	
		Sub-total		31376	1595	5.08	72	.23	45	.14	90	.29	250	.80	57	.18	1142	3.64	24	.08	3275	10.44
1946-1948	SP	C	P	193528	7372	3.81	287	.15	215	.11	145	.07	611	.32	202	.10	10489	5.42	103	.05	19424	10.04
	SP	ALT	P	15196	2988	19.66	275	1.81			267	1.76	269	1.77	135	.89	150	.99	3	.02	4087	26.90
	DF	C	P	2872	98	3.41	2	.07			2	.07	5	.17							107	3.73
	WC	C	B	169	2	1.18							1	.59					1	.59	4	2.37
		Other		600	81	13.50					1	.17					289	48.17			371	61.83
		Sub-total		212365	10541	4.96	564	.27	215	.10	415	.20	886	.42	337	.16	10928	5.15	107	.05	23993	11.30
1949-1951	SP	C	P	252122	2923	1.16	131	.05	322	.13	106	.04	262	.10	114	.05	5438	2.16	104	.04	9400	3.73
	SP	P	P	7103	16	.23	1	.01									28	.39			45	.63
		Other			11		1														12	
		Sub-total		259225	2950	1.14	133	.05	322	.12	106	.04	262	.10	114	.04	5466	2.11	104	.04	9457	3.65
1952-1954	SP	C	P	134409	291	.22	36	.03	190	.14	17	.01	96	.07	53	.04	3576	2.66	8	.01	4267	3.17
		Other			2																2	
		Sub-total		134409	293	.22	36	.03	190	.14	17	.01	96	.07	53	.04	3576	2.66	8	.01	4269	3.18
1955-1957	SP	C	P	66933	83	.12	13	.02			2		41	.06	26	.04	79	.12	4	.01	248	.37
	SP	P	P	460																		
		Sub-total		67393	83	.12	13	.02			2		41	.06	26	.04	79	.12	4	.01	248	.37
1958-1960	SP	C	P	61795	18	.03	6	.01			23	.04	10	.02	13	.02	54	.09	1		125	.20
	SP	A	P	974																		
	SP	P	P	5826											1	.02	5	.09			6	.10
		Sub-total		68595	18	.03	6	.01			23	.03	10	.01	14	.02	59	.09	1		131	.19
1961-1963	SP	C	P	73422	2								1		7	.01	96	.13	1		107	.15
	SP	A	P	3372																		
	SP	P	P	12388													1	.01			1	.01
		Sub-total		89182	2								1		7	.01	97	.11	1		108	.12
		TOTAL		1088663	27234		1299		961		886		2270		892		48031		398		81971	

*See explanation of codes on first page of Table 3.1.

TABLE 3.5 DECAY ZONE 5

NUMBER OF POLES PURCHASED AND CASUALTIES BY CAUSE
1951 through 1963
By Vintage, Species, Preservative and Treatment

Vintage years	Species	Preservative	Treatment	Number purchased	Casualties due to each cause during 13 years (or since year of manufacture)																	
					Decay		Lightning		Sleet, snow		Wind		Woodpeckers		Mechanical		No damage		Misc.		All causes	
	*	*	*		no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.	no.	pct.
1937-39	SP	C	P	37124	4167	11.22	349	.94	6	.02	100	.27	304	.82	65	.18	4091	11.02	127	.34	9209	24.81
1940-1942	SP	C	P	34960	3876	11.09	100	.29	21	.06	136	.39	399	1.14	63	.18	3574	10.22	94	.27	8263	23.64
		Other		185	8	4.32															8	4.32
		Sub-total		35145	3884	11.05	100	.28	21	.06	136	.39	399	1.14	63	.18	3574	10.17	94	.27	8271	23.53
1943-1945	SP	C	P	15947	1330	8.34	28	.18			15	.09	113	.71	21	.13	718	4.50	85	.53	2310	14.49
		Other			2								2								4	
		Sub-total		15947	1332	8.35	28	.18			15	.09	115	.72	21	.13	718	4.50	85	.53	2314	14.51
1946-1948	SP	C	P	57187	5893	10.30	228	.40	14	.02	172	.30	365	.64	98	.17	4262	7.45	120	.21	11152	19.50
	SP	P	P	2062	15	.73							4	.19							19	.92
	SP	ALT	P	7446	2602	34.94	7	.09			11	.15	20	.27	6	.08	298	4.00	10	.13	2954	39.67
		Sub-total		66695	8510	12.76	235	.35	14	.02	183	.27	389	.58	104	.16	4560	6.84	130	.19	14125	21.18
1949-1951	SP	C	P	56786	2068	3.64	61	.11	7	.01	27	.05	167	.29	82	.14	2097	3.69	58	.10	4567	8.04
	SP	P	P	592									3	.51			5	.84			8	1.35
		Other			1																1	
		Sub-total		57378	2069	3.61	61	.11	7	.01	27	.05	170	.30	82	.14	2102	3.66	58	.10	4576	7.98
1952-54	SP	C	P	37799	188	.50	31	.08			12	.03	93	.25	24	.06	317	.84	8	.02	673	1.78
1955-1957	SP	C	P	34136	44	.13	6	.02			3	.01	74	.22	22	.06	87	.25	2	.01	238	.70
		Other															1				1	
		Sub-total		34136	44	.13	6	.02			3	.01	74	.22	22	.06	88	.26	2	.01	239	.70
1958-1960	SP	C	P	33992	6	.02	8	.02			3	.01	81	.24	9	.03	265	.78	2	.01	374	1.10
	SP	A	P	1349			1	.07									5	.37	1	.07	7	.52
	SP	P	P	2171			1	.05									10	.46			11	.51
		Sub-total		37512	6	.02	10	.03			3	.01	81	.22	9	.02	280	.75	3	.01	392	1.04
1961-1963	SP	C	P	32770			2	.01					2	.01	11	.03	175	.53			190	.58
	SP	A	P	6422											1	.02	56	.87			57	.89
	SP	P	P	6205													36	.58			36	.58
		Sub-total		45397			2						2		12	.03	267	.59			283	.62
		TOTAL		367133	20200		822		48		479		1627		402		15997		507		40082	

See explanation of codes on first page of Table 3.1.

APPENDIX I

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

EQUIPMENT IN SERVICE

TO: U S DEPARTMENT OF AGRICULTURE, REA, WASHINGTON 25, D.C.
ATTN.: ELECTRIC STANDARDS DIVISION

INSTRUCTIONS - See reverse side.

Budget Bureau No. 40-R2748.3
Approval Expires August 31, 1965

(1 - 3)

SYSTEM DESIGNATION (4 - 11)

DATE (12 - 13)

PART III POLES 3 (14)

a. TREATING PLANT	b. FOR REA USE ONLY (15 - 18)	c. *SPECIES (Check) (23 - 26)					d. TREATMENT (Check or indicate retention)			e. *PRESERVATIVE USED (Check)				f. YEAR PURCHASED (46 - 47)	g. NUMBER PURCHASED (55 - 60)
							PRES.	NON-PRES.							
		SP	LP	DF	WC	Other	BORE	FULL L.	BUTT	C	A	P	Other		
CODES - FOR REA USE ONLY		1	2	3	4		1	2	3	1	2	4			
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															
11.															
12.															
13.															
14.															
15.															
16.															
17.															
18.															
19.															
20.															
21.															
TOTAL															
NUMBER OF POLES AS OF LAST DECEMBER 31.	IN PLANT (CPR)														
	IN STOCK (Inventory)														

REA FORM 860c REV. 7-62

*Indicate species and preservative used. See instructions for meaning of letter codes.
(If more space is needed, continue on reverse side or use additional sheets and refer to Part III)

INSTRUCTIONS

Forward the origioal to REA. The copy is for your records.

List separately by treating plant, species, treatmeot, preservative used and year purchased, and check appropriate columns for each eotry.

It is recommeoded that checking of poles in place for preparation of this list be avoided. Where details are not available, give the information that is known aloog with the number of poles to which it applies.

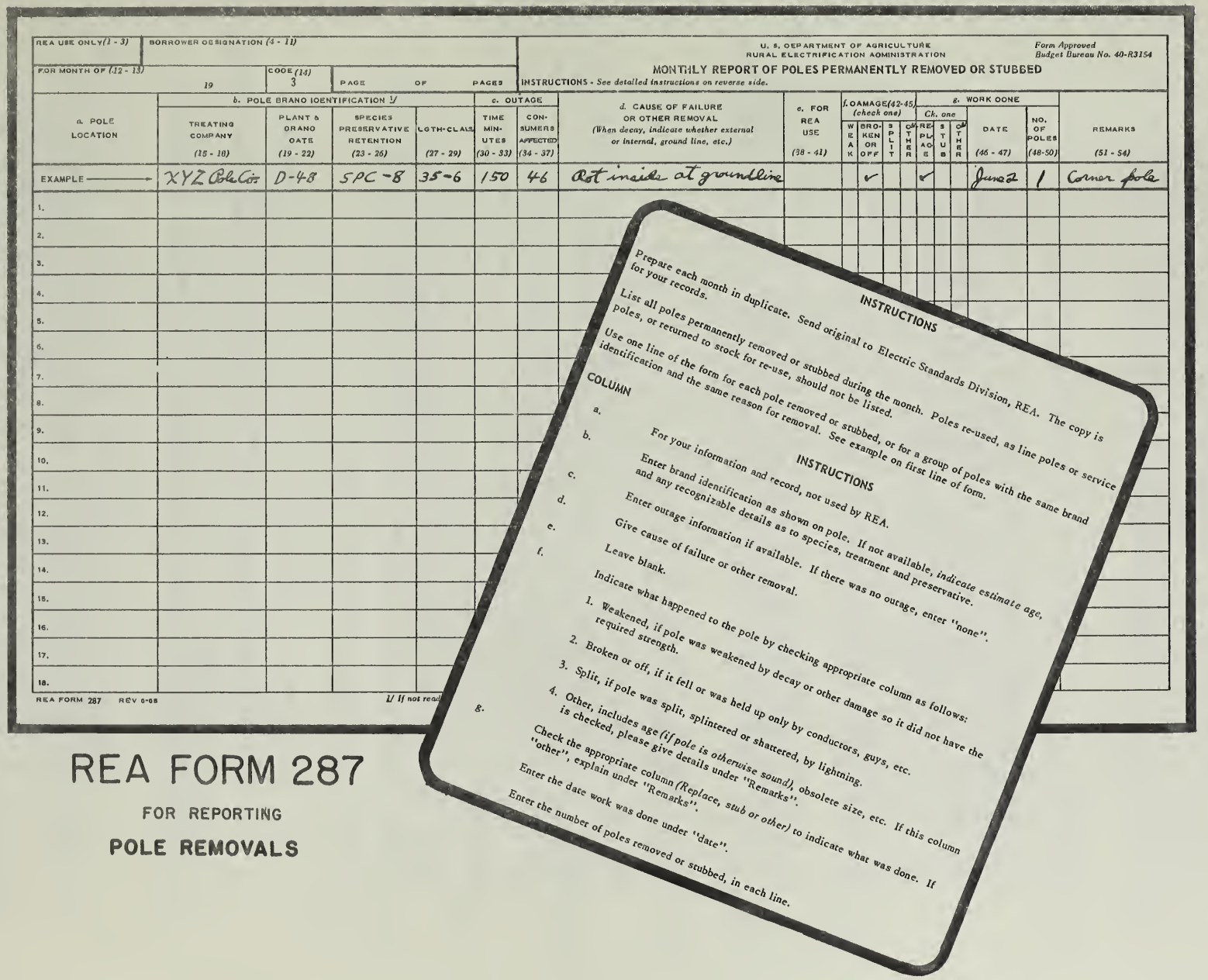
COLUMN	INSTRUCTIONS
a.	Enter name of treating plant.
b.	Leave blank for REA use.
c.	Check appropriate column according to species. Letter symbols are those used in pole brands, as follows: SP - Southern Pine LP - Lodgepole Pioe DF - Douglas Fir WC - Western Cedar For other species, check column marked "other" and indicate species.
d.	Check appropriate column to indicate method of treatment. Where pressure treated, enter retention, pounds per cubic foot.
e.	Check appropriate column to indicate preservative used. Preservative symbols as used in pole grounds are as follows: C - Coal tar creosote A - Coal tar creosote reinforced with 2 percent pentachlorophenol P - Peotachlorophenol
f.	Make entries separately for each year.
g.	Enter the oumber purchased for eacb group of poles listed.

REMARKS:

REA FORM 860c

FOR REPORTING

POLE PURCHASES



REA USE ONLY (1 - 3) | BORROWER DESIGNATION (4 - 11)

FOR MONTH OF (12 - 13) 19 | CODE (14) 3 | PAGE OF PAGES

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

Form Approved
Budget Bureau No. 40-R3154

MONTHLY REPORT OF POLES PERMANENTLY REMOVED OR STUBBED

INSTRUCTIONS - See detailed instructions on reverse side.

a. POLE LOCATION	b. POLE BRAND IDENTIFICATION 1/				c. OUTAGE		d. CAUSE OF FAILURE OR OTHER REMOVAL (When decay, indicate whether external or internal, ground line, etc.)	e. FOR REA USE (38 - 41)	f. DAMAGE (42-45) (check one)				g. WORK DONE				REMARKS (51 - 54)
	TREATING COMPANY (15 - 18)	PLANT & BRAND DATE (19 - 22)	SPECIES PRESERVATIVE RETENTION (23 - 26)	LGTH-CLASS (27 - 29)	TIME MINUTES (30 - 33)	CONSUMERS AFFECTED (34 - 37)			WEAK	BROKEN OR OFF	SPLIT	OTHER	Ck. one REPLACE	Ck. one STUBS	Ck. one OTHER	DATE (46 - 47)	NO. OF POLES (48-50)	
EXAMPLE →	XYZ Pole Co.	D-48	SPC-8	35-6	150	46	Rot inside at groundline			✓			✓			June 2	1	Corner pole
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
7.																		
8.																		
9.																		
10.																		
11.																		
12.																		
13.																		
14.																		
15.																		
16.																		
17.																		
18.																		

REA FORM 287 REV 6-65

1/ If not read

INSTRUCTIONS

Prepare each month in duplicate. Send original to Electric Standards Division, REA. The copy is for your records.

List all poles permanently removed or stubbed during the month. Poles re-used, as line poles or service poles, or returned to stock for re-use, should not be listed.

Use one line of the form for each pole removed or stubbed, or for a group of poles with the same brand identification and the same reason for removal. See example on first line of form.

INSTRUCTIONS

COLUMN

a. For your information and record, not used by REA.

b. Enter brand identification as shown on pole. If not available, indicate estimate age, and any recognizable details as to species, treatment and preservative.

c. Enter outage information if available. If there was no outage, enter "none".

d. Give cause of failure or other removal.

e. Leave blank.

f. Indicate what happened to the pole by checking appropriate column as follows:

1. Weakened, if pole was weakened by decay or other damage so it did not have the required strength.
2. Broken or off, if it fell or was held up only by conductors, guys, etc.
3. Split, if pole was split, splintered or shattered, by lightning.
4. Other, includes age (if pole is otherwise sound), obsolete size, etc. If this column is checked, please give details under "Remarks".

g. Check the appropriate column (Replace, stub or other) to indicate what was done. If "other", explain under "Remarks".

Enter the date work was done under "date".

Enter the number of poles removed or stubbed, in each line.

REA FORM 287

FOR REPORTING

POLE REMOVALS

APPENDIX II

REQUIREMENTS FOR INPUT DATA

I. General

The REA Pole Performance Study is based on a continuing analysis of the operating experience of selected electric borrowers throughout the United States. Participants furnish information about poles purchased and poles that fail in service or are disposed of for other reasons. This information is received by REA, processed, and translated into reports of value to borrowers, REA and others in the electric utility and timber industries.

Information needed from participants consists of reports of poles purchased, REA Form 860c, requested once each year; and reports of poles permanently removed or stubbed, REA Form 287, requested monthly.

II. Details needed in reported data

Some items of information are so important that participants are asked to include them for every pole reported, providing estimates when details are not known. If such items are missing when reports are received, the REA staff is required to enter information on the basis of the best assumptions possible or make further inquiry before the reports are processed.

Other details are tabulated when available but can be omitted without interfering with use of other information in the report.

A. Pole purchases (REA Form 860c)

1. Required for each report (pole, or group of poles):
   a. Brand year (or year of original purchase)
   b. Species, preservative and treatment (pressure, thermal or butt)
   c. Number of poles purchased (or otherwise acquired) this year

2. Requested but not essential for processing of other data:
   a. Retention (amount of preservative) if poles were pressure treated
   b. Treating company (not broker); if in doubt send sketch of brand

The last two items--retention and treating company--have not been consistently available on older poles. Complete details are requested on newer poles, for better evaluation of preservatives and to check on adequacy of inspection and treatment.

B. Poles Permanently Removed or Stubbed

1. Required for every pole or group of poles reported, prior to processing:
   a. Brand year (or year of purchase)
   b. Species, preservative and treatment
   c. Condition of the pole

      (1) Broken or off (cannot support conductor) INDICATE CAUSE.
      (2) Weak (not up to code strength for size pole) INDICATE CAUSE. (Poles that would have still been serviceable in absence of line changes should not be reported as weak.)

   d. Cause of damage (if weak or broken), such as decay, woodpeckers, lightning, sleet; or other reason for selling or "junking" the pole--road move, longer pole needed, etc.
   e. (For poles in line) whether stubbed instead of replaced.
   f. If the pole being reported had been previously stubbed, this should be indicated.

2. Requested but not essential for processing of other data;
   a. Retention (amount of preservative) if poles were pressure treated
   b. Treating company (not broker); if in doubt send sketch of brand.
   c. Location on pole of break or damage; e.g. ground line, mid-part or top of the pole

3. Additional details tabulated when in reports:
   a. Outage information
   b. Kind of pole (equipment pole, tangent, corner, etc.)
   c. Additional details as to cause and circumstances of failure
   d. Length and class of pole

III. Reconciling of the records of the pole study with the number of poles physically present

It is important to know whether the pole population reflected in the records of the pole study is in agreement with the number of

poles owned by each participating borrower. This is checked once each year following the receipt of REA Form 860c.

For purposes of the pole study the number of "poles owned" includes those in plant and those in stock or inventory. The only transactions that influence survey records are pole purchases and poles stubbed or disposed of. The poles disposed of would include those that fail in service, those found to be worthless after removal, used poles sold or given to property owners, and new poles sold (assuming that they were included in the pole purchase records).

The check against property records consists of taking the number of poles owned at the end of the previous year (December 31, 1963), adding the number of poles purchased during the year (1964), subtracting the number of poles permanently removed, and comparing the balance with the total number of poles owned as of the end of the year (December 31, 1964).

As a further check the number of poles per mile is calculated from poles owned (survey records) divided by miles energized (REA statistical report). If the number of poles owned appears reasonable and there is little change from year to year, this gives evidence that survey records are reasonably correct.

IV. Stubbed Poles

Poles that have been stubbed require special attention in balancing against property records since a pole that has been stubbed has failed for purposes of survey records but still remains a pole in plant. This is taken into account when survey records are balanced against property records, giving special attention to the poles reported as stubbed. This is the reason for a special tabulation of pole data which will appear as Table 2 in reports to participating borrowers.